ECOSYSTEM-BASED MANAGEMENT: THE PROMISE OF PROCESS

By Erica Goldman, Maryland Sea Grant

Marine and coastal environments form complex interdependent webs of life. Big fish, little fish, plankton, crabs, algae, and reef-builders like coral or oysters all interact according to intricate rules of eat and be eaten. Humans play an integral node in this web, relying on marine and coastal systems for both livelihoods and recreation in a co-dependent relationship that requires the environment to remain healthy and vibrant.

How can we manage such complex, interdependent ecosystems in a way that integrates ecological, social, and economic goals? The answer may be ecosystem-based management, an approach that recognizes humans as key components of aquatic ecosystems, accounts for both ecological and political boundaries, and engages all stakeholders in the management process.

Ecosystem-based management is a natural fit for Sea Grant. Research support for sound science, sustained facilitation and coordination, communication and education—are all hallmarks of ecosystem-based management—and these are the strengths of Sea Grant.

From all over the United States, Sea Grant is making progress in ecosystem-based management. From the Great Lakes to New England to the coast of California, and from the Puget Sound to the Chesapeake Bay, Sea Grant-supported scientific research has expanded to meet the needs of interconnected social-natural ecosystems. Such research, integrated with policy, has helped pioneer institutional or interstate commitments which are working to forge a new way forward.

The Great Lakes

Sea Grant ecosystem-based management of the Great Lakes dates back more than 30 years. Lake Erie is an early case study for the success of Sea Grant ecosystem-based management activities. When the Cuyahoga River caught fire in 1969, pollution grabbed the national spotlight. Today, thanks to coordinated and sustained efforts to reduce pollutants, including phosphorus loading, Lake Erie boasts a robust walleye population, lucrative fishery, and thriving charter boat industry.

How did ecosystem-based management help turn the tide for Lake Erie? What role did Sea Grant play?

The context for an integrative ecosystem-based management framework dates back to the turn of the 20th century with the signing of the Boundary Waters Treaty in 1909 and the establishment of the International Joint Commission, which was created to assist the U.S. and Canada in the protection of the trans-boundary environment. But despite the historic Great Lakes Water Quality Agreement of 1972 and much talk about the need for coordination in water quality and fisheries monitoring, the Great Lakes still lacked the necessary "integrative framework" for taking an ecosystem approach to research management. This was the finding of a special report of the International Joint Commission's Research Advisory Board in 1978.

In the years to come, the Great Lakes Sea Grant programs would play a key role in building that "integrative framework." They provided targeted research funding aimed at unraveling the food web architecture of Great Lake ecosystems. In Lake Erie, as phosphorus loads began to drop and the walleye population surged, Sea Grant worked closely with charter boat operators to ensure that fishery and boating industry both recovered in a sustainable manner.

In 1998, Ohio Sea Grant facilitated a meeting that brought together a group of scientists to discuss research needs, particularly with respect to phosphorus levels and invasive zebra mussels. This collaboration brought more than 50 scientists from four states, and became the Lake Erie Millennium Network, a group that includes representatives from both academia and federal agencies in the United States and Canada.

In following years, the network held 19 workshops and coordinated the development of dozens of research projects. In 2005, the International Joint Commission formally recognized the work of the Lake Erie Millennium Network and recommended the formation of similar groups for the other Great Lakes.

In response to the Joint Commission's recommendation, Sea Grant programs from all of the Great Lakes states came together in 2006 to develop a regional proposal to NOAA Sea Grant for the creation of the Great Lakes Regional Research Information Network with the goal to coordinate research and provide a single point of contact for each lake to reach all research scientists in the region.

Sea Grant directors for Michigan, Ohio, New York, Minnesota, and Wisconsin currently head up the network for each of the Great Lakes, with Jeff Reutter, Ohio Sea Grant Director, acting as one of the four overarching coordinators, along with an academic representative from Canada and two agency heads.

The Great Lakes Regional Research Information Network helps fund science crucial to ecosystem-based management. The network provides integrated support for interdisciplinary research, aligning scientists with the need for multilayered studies on complex questions. In 2009, Sea Grant coordination and facilitation helped 25 researchers from 14 different institutions come together to submit 7 individual proposals on complementary research projects. All seven projects also received funding from EPA, resulting in an innovative research program integrated across topic areas and institutions.

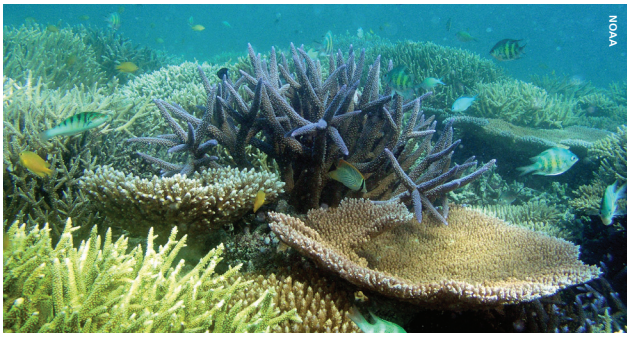
Filling a crucial niche

Ecosystem-based management tends to play out mostly on a large scale. It draws together agencies, managers, industries, and large-scale, applied research initiatives. With its interdisciplinary structure, Sea Grant can serve a key role, adding value to ecosystem-based management in strategic ways. Sea Grant programs have programmatic strengths and can leverage funding to catalyze targeted and well integrated research, outreach, and technical assistance.

In the Chesapeake Bay region, ecosystem-based management began with creation of the Chesapeake Bay Program in 1983. This watershed partnership brings together the states of Maryland, Virginia, and Pennsylvania, the District of Columbia, the U.S. Environmental Protection Agency, and the Chesapeake Bay Commission, a tri-state legislative body. These parties have pledged to work together, under the construct of Chesapeake Bay Agreement, to restore the Bay.

Over the years, Sea Grant programs in Maryland and Virginia have helped to fund critical research on hypoxia, nutrient cycling, food web relationships, and fisheries. Sea Grant engagement in the Bi-State Blue Crab Advisory Committee played a key role in setting terms for blue crab management in the Bay, along with developing a framework for ongoing management. Maryland Sea Grant is now deeply engaged in forging a process for ecosystem-based fisheries management in the Bay, one that involves creating a new operational structure. So far, more than 80 individuals from 12 different states are engaged in the ecosystem-based fisheries management effort on a volunteer basis. They represent academic and research institutions, non-governmental organizations, state and federal management agencies, and independent contractors.

On the West Coast, ecosystem-based management is playing out in grand proportions in California—a state with a very strong conservation ethic. Since Governor Arnold Schwarzenegger put forth the Ocean Action Plan in 2004, tens of millions of dollars have been allocated for ocean protection, monitoring, and


NOAA

the establishment of a network of marine reserves. Held as a national model, the California Marine Life Protection Act, passed in 1999 and now part of the California Fish and Game Code, requires California to reevaluate all existing marine protected areas potentially design new ones that together function as a statewide network.

In this environment of big players and big dollars, it becomes critical that Sea Grant contribute strategically, explains Christina Johnson, science writer for California Sea Grant. Partnerships become essential, explains Johnson, including working closely with state government.

In New England, Rhode Island offers another example of a place where Sea Grant's contributions to ecosystem-based management are deeply entrenched. For 30 years, Rhode Island Sea Grant has worked with the RI Coastal Resources Management Council to develop and implement Special Area Management Plans (SAMPs), affectionately called "tools with teeth". SAMPs are science-based ecosystems-based management plans that comprehensively review ecosystems, regulatory environments and social structures, then propose guidance on regulations to be adopted by the state. Such guidance is closely tailored to the unique ecological and social conditions of each place. To date, Rhode Island has six SAMPs in place for its rural, suburban and urban coasts, and island ecosystems, plus has developed the first interstate SAMP for ecosystems it shares with Connecticut. Now in the works, Rhode Island's 7th SAMP will be the largest ever, covering 1,500 square miles of ocean, with a focus on the state's push to develop renewable offshore energy from wind. Rhode Island Sea Grant's Coastal Extension Leader Jennifer McCann has led the $10 million process with co-PIs from many university, state and federal organizations. "In Rhode Island," she says, "we know how to SAMP." ❖